X

PROGRESS REPORT

OF

THE FOREST SURVEY BRANCH

FOR

1889-90.

1891.

No. 469-F., dated the 22nd April 1891.

From—SIR E. C. BUCK, Kt., *Secretary to the Government of India,*
To—*The Surveyor-General of India.*

I AM directed to acknowledge the receipt of your letter No. 244-S., dated the 16th January last, submitting the Annual Progress Report of the Forest Survey Branch for the year 1889-90 (ending 30th September), prepared by the Superintendent, Mr. W. H. Reynolds.

2. The work done during the year under review has been fully analysed in your letter and calls for no remarks by the Government of India, except as regards the failure in Assam. His Excellency in Council, while concurring in your commendation of the progress made on the whole, considers that the explanation offered with regard to this failure by Mr. Litchfield, who acted for Mr. Reynolds during the absence of the latter on furlough, is unsatisfactory. With this exception the Forest Survey Branch of your Department has maintained its standard of work, and the Government of India record with satisfaction their acknowledgment of the continued good services of Mr. Reynolds, the Superintendent in charge thereof.

No. 470-F.

COPY forwarded to the Inspector General of Forests for information.

[G. N. K.]

G. C. Press, Simla.—No. 155 R. & A. D.—29-4-91.—225.

PROGRESS REPORT OF THE FOREST SURVEY BRANCH FOR 1889-90.

No. 244 S., dated Calcutta, the 16th January 1891.

From—COLONEL H. R. THUILLIER, R.E., *Surveyor General of India,*

To—The Secretary to the Government of India, REVENUE AND AGRICULTURAL DEPT.

I HAVE the honour to forward the Annual Progress Report of the Forest Survey Branch for the year 1889-90 (ending the 30th September 1890), submitted by Mr. W. H. Reynolds, Superintendent.

2. Mr. Reynolds held charge of the Forest Survey Branch until the 24th January 1890, when he proceeded on furlough and Mr. E. Litchfield assumed charge and held it during the remainder of the year.

3. The principal operations of the season were in Bashahr, Punjab; in the Jubbulpore, Raipur, and Bhandara districts, Central Provinces; and in the Goalpara district, Assam. The other operations comprised the completion of the forests in Tehri Garhwal of Korwa and Karamba, in the Jaunsar Division, of Ninglat-Gogar, in the Naini Tal Division, and of the Ahiri forests, in the Chanda district, Central Provinces, all of which were in progress during the previous year. Of the main operations the surveys of the forests in the Bhandara district, Central Provinces, and in the Goalpara district, Assam, were newly instituted during the year.

4. The outturn of field and office work is shown in detail in Appendices A and B. The total area surveyed is 1,030 square miles, of which 70 square miles of boundary survey were mapped on the 16-inch scale, 657 square miles of forests on the 4-inch scale, and 302 square miles on the 1-inch scale, for topographical purposes. This area is considerably in excess of the outturn for the preceding season and above the average for the past three years. The area triangulated is less than that of last year, being 987 against 1,904 square miles. The larger outturn of topographical work is due chiefly to a large portion of it having been surveyed on the small scale of 1-inch = 1 mile. The traverse data of the Imperial revenue surveys were made full use of wherever available and proved most useful for the boundary surveys. In Assam, however, the data could not be utilized, as no permanent marks were forthcoming. A statement of the classes of areas surveyed is given in Appendix E. Of traverse work, 199 linear miles were run with theodolite and compass.

	16-inch.	4-inch.	1-inch.
1886-87	...	508	395
1887-88	...	207	553
1888-89	32	617	3
Average	11	444	317

5. With regard to the survey in the Goalpara district, Assam, nothing more than the preliminary work of triangulation and traversing was done, and Mr. Reynolds reports that the connection of this work with the Great Trigonometrical Survey was not effected, and that, consequently, no basis was obtained on which the work could be computed and proved during the recess, and the consequence is that much valuable time will be lost in the ensuing field season before the detail survey can be commenced. Mr. Litchfield, the Officiating Superintendent, was in charge of this survey up to 15th March, and subsequently Mr. Kelly held charge. Mr. Litchfield reports that Mr. Kelly is responsible for the failure to connect the work, as he closed work and withdrew the

establishment without orders, subsequently attributing the omission to unfavourable weather. This explanation cannot be considered satisfactory. The failure amounts to serious neglect of an obvious duty, for which Messrs. Litchfield and Kelly must be held jointly responsible.

6. The topographical surveys have been checked, as usual, by the European Assistants, and in addition to the instrumental contours, *partal* lines were run in places, and 103 linear miles of levelling with the theodolite were run through the work, but nothing is stated as to the results of these tests.

7. The cost-rates per square mile of the Bashahr State surveys, including triangulation in advance, were R65-8 for the 4-inch work and R14-6 for the 1-inch work. In the previous year the cost-rate for the 4-inch survey was R57-8; and the average rate for the past three years was R59-3. The increase in this season's rate is attributed to the retardation of the work by unusually heavy rains. For the surveys in the Central Provinces the cost-rates are as follow:

Jubbulpore district (including 16-inch surveys), R58-8; Raipur district (including 16-inch work), R50; Chanda district (including 16-inch work, triangulation and traverse), R75-7. The higher rate in the last district is said to be due to the greater cost of local labour and the frequent stoppages caused by the desertion of the men. In Bhandara district the cost-rate was R12-4. In the North-West Provinces the cost-rate of the surveys in Tehri Garhwal, Korwa and Karamba, was R30.

8. The details of the mapping executed during the year are given in Appendix B. The forest map of India, mentioned in last year's report as being in progress, was published. Of the Punjab, twenty-two 4-inch standard sheets containing the Bashahr forests are in progress, and four 1-inch charts of triangulation. One 4-inch sheet of Bashahr was published and another is in the Press. A map showing the forests of the Chamba territory on the 2-mile scale is also in the Press.

Of the North-West Provinces five standard sheets were revised with a view to the publication of second editions; two 1-inch charts of triangulation and traversing were published, and a map of the Kumaon, Garhwal, and Bijnor districts, on the 4-mile scale, is in progress, besides six 4-inch sheets containing the forests of Tehri Garhwal, and a 16-inch map of the Korwa forest, which is in the Press.

The 4-inch map of the Bamboo Reserve in the Garo Hills Division, Assam, was published during the year.

Of the Bengal standard maps, thirteen boundary sheets of the Singhbhoom forests, on the 4-inch scale, were sent to Press.

Fifteen 4-inch and four 2-inch standard sheets of the Melghat survey, Berar, were published during the year; and four 4-inch and two 2-inch sheets, together with three 4-inch sheets of congregated village plans, were sent to Press. Eight 1-inch charts of triangulation and a map of the Dariapur taluq were also published.

Of the Central Provinces, ten 4-inch standard sheets of Jubbulpore district, one of Raipur district, and two of the Ahiri forests in Chanda district, together with a 4-mile index map of the forest surveys in Bhandara district, are in progress.

Several 1-inch maps of forest reserves in Burma were also sent to Press during the year.

The photo-zincographing of the maps prepared by the Forest Survey Branch continues to be carried on at the Trigonometrical Survey Office, Dehra Dun.

9. Instruction was given in the Forest School at Dehra Dun, as usual, by the Assistants of the Forest Survey Branch, both in Drawing and in Field Surveying. Two drawing classes were held between the 1st July and the 31st October 1890, which were attended by 73 students.

10. With the exception of the failure in Assam, the results of the year's operations are very satisfactory.

11. The total expenditure for the year amounted to R91,553 against R78,988 in the previous year. The increase is due to the new surveys instituted in Assam and the Central Provinces.

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ANNUAL PROGRESS REPORT

OF THE

FOREST SURVEY BRANCH OF THE FOREST DEPARTMENT,

FROM 1ST OCTOBER 1889 TO 30TH SEPTEMBER 1890.

BY

W. H. REYNOLDS, ESQ., F.R.G.S.,

SUPERINTENDENT OF FOREST SURVEYS.

THE operations of the Forest Survey Branch of the Forest Department that are now reported on are for the survey year of 1889-90, or the period 1st October 1889 to 30th September 1890.

2. Mr. W. H. Reynolds, Superintendent of Forest Surveys, was in charge of the operations from the 1st October 1889 to 24th January 1890, when he made over charge of his office to Mr. E. Litchfield, Deputy Conservator of Forests, and proceeded on furlough. Mr. Litchfield conducted the work from 25th January to the close of the survey year.

THE SEASON'S FIELD WORK.

Surveys completed and in progress.

3. The main field operations were confined chiefly to Bashahr in the Punjab, and the districts of Jubbulpore, Raipur, and Bhandara in the Central Provinces, and the Goalpara district in Assam.

4. The surveys of the forests in Tehri Garhwal, Korwa and Karamba of the Jaunsar Division, and the Ninglat-Gogar forests of the Naini Tal Division, North-West Provinces, as well as the Ahiri forests in the Chanda district of the Central Provinces, which were reported as having been commenced or in progress during the previous year, were completed during the year under report.

New surveys commenced during the year

5. The new surveys commenced during the year were (1) the forests in the Bhandara district of the Central Provinces; and (2) those in the Goalpara district of Assam. The former were taken in hand in accordance with the orders communicated in the correspondence ending with the Inspector General of Forests' endorsement No. 952, dated 28th December 1888, and the latter in accordance with his endorsement No. 984, dated 9th October 1889. In connection with the survey of the forests in the Goalpara district the demarcation and survey of the $\frac{\text{Bhutan}}{\text{Goalpara}}$ boundary is to be taken in hand, (*vide* correspondence ending with Inspector General of Forests' No. 1183, dated 5th December 1889).

Duration of the field season.

6. The average duration of the field season for parties working in the Central Provinces was 6½ months, for those working in the Himalayas it was about 4 months, and in Assam 5 months.

The Central Provinces parties were in the field from early in November till late in May. In Assam the Surveyors were out from the end of October till the beginning of April, and in the Himalayas they were out at various periods from one to five months during the summer season.

Triangulation and traversing.

7. Triangulation was extended over an area of 987 square miles as against 1,904 in the previous year, and 199 linear miles of traversing was run with theodolite and compass.

Area topographically surveyed.

8. The area topographically surveyed in detail is 1,029 square miles, *viz.*—

On the 16-inch scale,	70	square	miles.	
„	4-inch	„	657	„ „
„	1-inch	„	302	„ „

Forest growth and soil tracings.

9. For the areas surveyed on the 4-inch scale in the Central Provinces a tracing illustrating the distributions of forests as well as the classification of soils were prepared, and for other areas on the 4-inch scale tracings were prepared, showing the distribution of forests and density of growth.

Check surveys.

10. The usual checks were applied to the topographical work by the European assistants in charge of sub-parties, and, in addition to the instrumental contours, *partal* lines were run in places, and 103 linear miles of levelling with the theodolite was run through the work.

Comparison with previous year.

11. As compared with the previous year, the area triangulated during 1889-90 is somewhat less, whilst the area topographically surveyed is a good deal in excess of that of the previous year. The large outturn of topographical work for 1889-90 is due chiefly to a large portion of it having been done on the small scale of 1″=1 mile, as well as to the fact of the junior European assistants, who were appointed in 1888, having become more expert at their work and consequently able to render greater assistance in field work and in the management of native Surveyors.

Summary of outturn of field work and computations.

12. In Appendix A will be found a summary of the outturn of field work and computations, and in Appendix E is given a statement of the classes of areas surveyed.

Expenditure for the year.

13. The total expenditure for the year incurred by the Forest Survey Branch in the several provinces in which survey operations were in progress, as well as for work not connected with these surveys, amounts to ₹91,553 against ₹78,988 in the previous year. The increase is due to the new surveys in Assam and the Bhandara district of the Central Provinces having been taken up during the year.

Expenditure under Provincial headings.

14. Appendix C exhibits in detail and under provincial headings the expenditure for the year.

Cost-rate.

15. For each of the separate surveys the cost-rate per square mile, as well as more detailed information regarding each survey, is given under the provincial heading of the several provinces in which surveys were in progress.

Punjab.

Bashahr survey.

16. In the Punjab the survey of the Bashahr State was continued. Triangulation was extended in the Pandra Bis pergunnah bordering on Kulu and Spiti, and up the Todang river in the Kailas forest range, while in the early part of the season detailed topographical work, on the 4-inch and 1-inch scales, was pushed on in the Pabar valley and the Bagi-Martgarh pergunnah, as well as in the Bashpa and Upper Sutlej valley during and after the monsoon.

Triangulation.

17. Two triangulating parties took the field in June and continued to work in the Upper Sutlej Valley till the middle of October, but owing to one of the Surveyors (Mr. Nichol) having fallen ill and being greatly debilitated during the greater part of the season, as well as to the very heavy fogs which prevailed (due to a prolonged and heavy monsoon), and the great elevations, 15,000 to 18,000 feet, at which theodolite observations were taken, the whole of the triangulation, which it was contemplated should be finished this year, was not completed. An area was triangulated covering 378 square miles against 889 square miles done during the previous season.

Area topographically surveyed.

18. The Surveyors employed on topographical work took the field in the middle of May and were still in Bashahr at the close of the survey year. Against an area of 215 square miles surveyed during the previous season, an area of 500 square miles was completed during the year under report, of which 198 square miles were surveyed on the 4-inch scale, with instrumental contours at vertical distances of 500 feet, and 302 square miles were surveyed on the 1-inch scale. The 1-inch areas, which are situated at elevations averaging 13,000 to 19,000 feet above sea-level, were surveyed entirely by European Surveyors, and the 4-inch work was done by Native Surveyors under the immediate supervision of Mr. E. Litchfield, who was with the Bashahr Party from the middle of June to early in September, and who also took part in the 1-inch work.

Index map showing progress.

19. The progress of the Bashahr work is illustrated on an index map, which is attached hereto as "Enclosure No. 1."

Season's cost-rate.

20. The cost of the season's work estimated on the area surveyed in detail, is—

4-inch scale R65-8 per square mile.
1 „ „ „ 14-6 „ „

These figures include the cost of the triangulation in advance. The rains in the Himalayas were unusually heavy, hence the field work was somewhat retarded.

The cost of the 4-inch work of the previous year was R57-8, and the average cost of the past three years is R59-3.

The total expenditure incurred on account of the Bashahr survey for the survey year under report is R17,461; the details are given in Appendix C.

Central Provinces.

Central Provinces surveys.

21. In the Central Provinces the Forest Survey Branch was employed on surveys in the districts of Jubbulpore, Raipur, Chanda, and Bhandara, the former were in progress during the previous year, and the survey of the forests in the Bhandara district were commenced in the early part of the field season of

1889-90 in accordance with the orders conveyed in Government of India letter No. 1226 F., dated 19th December 1888.

The survey of the Ahiri forests was completed during the year under report.

Total expenditure and average cost of surveys in Central Provinces.

22. The total expenditure incurred by the Forest Survey Branch for surveys in the several districts of the Central Provinces, *viz.* Jubbulpore, Raipur, Chanda, and Bhandara was R24,367, which is given in detail in Appendix C, and the aggregate area topographically surveyed was 488 square miles, of which 418 were surveyed on the 4-inch and 70 on the 16-inch scale. This gives an average cost of R50 per square mile for the entire season's work in the Central Provinces, inclusive of the 16-inch boundary surveys.

In Appendix A will be found a summary of the season's field work.

Jubbulpore District.

Jubbulpore survey.

23. The Jubbulpore Party, under Mr. T. S. Martin, left Dehra on the 2nd November and commenced field operations on the 10th idem. The season's work was confined to the pergunnahs of Sihora and Marwara; the party returned to recess-quarters on the 28th May.

Jubbulpore area surveyed.

24. One hundred and twenty-five square miles against 110 of the previous year were surveyed in full detail on the 4-inch scale, and 275 linear miles of forest boundary with strips of topography aggregating 34 square miles of country, were surveyed on the scale of 16-inches=1 mile, making in all a total area of 159 square miles of topographical work.

One hundred and sixteen miles of forest boundary, the pillars of which were numbered at the close of last year, were inspected and the pillar numbers added to field sheets. The Jubbulpore Index Map, attached hereto as Enclosure No. 2, illustrates the area surveyed, and in Appendix A will be found the detail of the work.

Distribution of forests and soil tracings.

25. Tracings illustrating the distribution of forests and the classification of soils were prepared for all forests under survey, and as the season progressed this branch of the work was scrutinized by the local Forest officers.

Tests applied to work.

26. The accuracy of the detail survey was tested in the usual way by running instrumental contours, and 11 miles of *partal*, or check, lines were run through the work.

Superintendent's visit to field party.

27. Mr. Reynolds, Superintendent of Forest Surveys, visited the Jubbulpore Party during the middle of December, and satisfied himself that the season's work had been fairly started.

Cost.

28. The cost of the field and office work for the year was R6,848, and the total expenditure incurred on account of forest surveys in the Jubbulpore district was R9,305; the details are given in Appendix C.

The cost of the season's work estimated on the area plane-tabled is R58-8 per square mile as against R54-9 in the previous year; these figures include the cost of the 16-inch boundary survey. The higher rate for the present season is chiefly due to a larger area having been surveyed on the 16-inch scale than was done during the previous year.

Raipur District.

Raipur surveys.

29. In the Raipur district surveys were carried on in continuation of the work of the previous field season, and was confined chiefly to the forests in the Sahawa pergunnah in the southern part of the district. The party under Mr. J. Martin left Dehra Dun on the 4th November; field work was commenced on the 18th idem, and was continued up to the 29th May.

Area topographically surveyed.

30. An area of 146·5 square miles was topographically surveyed, of which 142·5 is on the 4-inch scale and 4 square miles on the 16-inch scale, and 26 linear miles of forest boundaries were also surveyed on the larger scale.

The details of the work are given in Appendix A, and an index map of Raipur is attached as "Enclosure No. 3" illustrating the progress of the survey.

Forest soil tracings.

31. Tracings were prepared for all forest areas surveyed, detailing the distribution and density of forest growth, as well as the classification of soils.

Tests applied to work.

32. The topographical work was tested in the usual way by instrumental contours and "*partal* lines," and 103 linear miles of levelling with the theodolite was run through the plane-table work. The tracings illustrating the distribution of forests and classification of soils were scrutinized by the local Forest staff as the work progressed.

Superintendent's inspection.

33. Mr. Reynolds was in the Raipur district in the middle of January, and satisfied himself that the survey work was being efficiently executed.

Cost.

34. The expenditure on account of field and office work was R5,202, and the total expenditure for the year on account of forest surveys in the Raipur district, including all charges, was R7,356.

The cost per square mile of the season's work, estimated on the area plane-tabled, and including the boundary surveys on the 16-inch scale, is R50, as against R54-6 of the previous year.

Chanda District.

Survey of the Ahiri forests.

35. The survey of the Ahiri forests, which was left incomplete at the close of the field season of 1888-89 for reasons reported in paragraph 30 of the Progress Report for that year, was completed during the early part of the year under report.

Area topographically surveyed.

36. An area of 28 square miles was topographically surveyed and instrumental contours at vertical distances of 300 feet were run through the work.

Tracings illustrating the distribution of forests and density of growth were also prepared, as was done during the previous year, for the rest of the area of the Ahiri forest.

A tracing is attached as "Enclosure No. 4" showing the tract surveyed during 1889-90, as well as that surveyed during the previous year.

Cost.

37. The sum of R1,128 was expended on field and office work, and the total expenditure for the year was R1,142.

Including the expenditure of the previous year and estimating the cost on the total area surveyed, the final cost of the survey of the Ahiri forests in the

Chanda district, is for taiangulation R9-3-0, traversing R11-9 and plane-tabling on 4-inch and 16-inch scales (including other charges), R51-5, or a total cost of R75-7 per square mile. In the Melghat taluk of Berar the cost for similar work on the 4-inch scale was R80.

The Ahiri forests, owing to their isolated position in the midst of a zamindari estate and in a comparatively sparsely populated tract, made it difficult to obtain local labour, which was paid for at a higher rate than elsewhere in the Central Provinces, and the men were constantly absconding and causing stoppages in the field work, which naturally tended to increase the final cost-rate of the work.

Bhandara district.

Orders regarding the survey.

38. The survey of the forests in the Bhandara district was taken up in accordance with instructions conveyed in Government of India letter No. 1226 F., dated 19th December 1888, from the Under Secretary, Revenue and Agricultural Department, to the Chief Commissioner of the Central Provinces, and communicated to the Superintendent of Forest Surveys in Inspector General of Forests' No. 952, dated 20th December 1888.

Bhandara party.

39. Early in November a party for Bhandara was organized, and before the close of the month it had commenced field operation in the Bawanthari range. Field work was continued up to the 16th May, when the party returned to recess quarters.

The season's operations were confined to the forests in the northern and western portions of the district, and were supervised and checked by Mr. C. Litchfield.

Revenue survey traverse data

40. The revenue survey traversing was made full use of, and as all the stations were well marked, it proved most valuable for the boundary survey. But it was found necessary for the survey of the interior portions of the forests, as well as for the purpose of running instrumental contours, to supplement the traverse data with the additions of trigonometrical points, so as to secure a suitable basis for the topographical or plane-table work.

Area triangulated and topographically surveyed.

41. An area of 515 square miles was triangulated and 155 square miles were topographically surveyed in full detail, of which 123 square miles were done on the 4-inch and 32 on the 16-inch scale; 272 linear miles of forest boundaries were completed on the 16-inch scale.

The triangulation is well in advance of the detail survey.

A tracing illustrating the progress of the work is attached as "Enclosure No. 5."

Forest and soil records.

42. A record of the distribution of forest trees and the classification of soils was prepared for each of the forests under survey, similar to the record prepared for the Jubbulpore and Raipur forests.

Tests applied to work.

43. The topography was done in the same detail as the Jubbulpore and Raipur work, and it was tested by running instrumental contours throughout the entire work at fixed vertical distances; 27 miles of partal or check survey were also run through the work. The preparation of the record of forest growth and

classification of soils was supervised by an officer who had recently joined from Cooper's Hill College.

Mr. Reynolds was with this party during the early part of January, and satisfied himself that the work was being efficiently conducted.

Cost.

44. The cost of the field and office work for the season was R4,749, and the total expenditure for the year, including all charges, was R6,564.

The cost-rate per square mile, estimated on the area plane-tabled, is R42-4 against R53 and R50 in Jubbulpore and Raipur districts. The cheaper cost-rate of survey work in the Bhandara district is chiefly due to the fact that ordinary coolie labour was cheap, and was readily obtained in the vicinity of the forests which came under survey during the year and also in part to the forest tracts being comparatively healthy.

North-West Provinces.

Surveys in progress.

45. In the North-Western Provinces survey operations were conducted in the forests of the Central and School Circles, and a total area of 41·4 square miles was plane-tabled on the 4-inch scale, as well as 60·5 linear miles of boundary outside this area, and the positions of 346 pillars on forest boundaries were determined.

Central Circle.

Area surveyed.

46. In the Central Circle a small area of 2½ square miles of the Ninglat-Gogar forest, which was left over from the previous season, was plane-tabled, and the boundaries of the forests recently acquired from the Iron Company's grant those of the Kurpa Tal forests, as well as the boundaries of the Ninglat-Gogar forest (which were not demarcated when the topographical work of these forests was taken in hand), were surveyed.

Nothing farther in the way of field work remains to be done in the Central Circle.

Cost.

47. The total expenditure on account of surveys in the Central Circle was R817.

School Circle.

Surveys in progress.

48. In the School Circle surveys were in progress in the leased forests of Tehri-Garhwal and the forests of Karamba and Korwar in Jaunsar, all of which were completed during the year. These forests are situated in the Himalayas.

Area surveyed.

49. In Tehri-Garhwal an area of 35 square miles was surveyed in detail on the 4-inch scale, and the area surveyed in Karamba and Korwa was 4 square miles. Instrumental contours at vertical intervals of 500 feet were laid down throughout the work.

The Korwa survey was subsequently enlarged to the scale of 16 inches to the mile, and the map was printed on this scale.

The details of the season's field work are given in Appendix A.

Cost.

50. The amount expended on field and office work for surveys in the School Circle was R1,061, and the total expenditure, including all charges, was R1,167.

The cost-rate estimated on the area topographically surveyed was R30 per square mile. No triangulation was done, as this branch of the work was completed the previous year.

ASSAM.

Orders regarding the survey.

51. The survey of the sâl forests in the Goalpara district was sanctioned in Government of India letter No. 967, dated 13th September 1889, from the Secretary in the Revenue and Agricultural Department, to the Chief Commissioner of Assam, and at the request of the Chief Commissioner it was also ordered that the demarcation and survey of the Bhutan boundary touching on the Goalpara district should be taken up in connection with the forest survey of the district.

Goalpara survey: area surveyed.

52. Accordingly a party was organized in October and proceeded to Dhubri, where it commenced work under Mr. E. Litchfield early in November. Nothing beyond the preliminary work of triangulation and traversing was done,—the former was extended over an area of 94 square miles, and the latter covered 437 square miles.

But owing to the non-connection of the work with the triangulation of the Great Trigonometrical series, the season's work, up to the close of the year had not been computed.

Officer in charge of party.

53. Mr. E. Litchfield, Deputy Conservator of Forests, was in charge of this survey from the 27th October 1889 to the 15th March 1890, and Mr. Kelly, Sub-Assistant Conservator, held charge from 15th March to the close of the field season. Both these officers report (whilst they were respectively in charge) that, owing to the weather being unfavourable, the connection of the season's work with the Brahmaputra series of the Great Trigonometrical Survey triangulation could not be effected; this can scarcely be considered sufficient reason for having brought in the whole of the traversing, as well as triangulation, in such an incomplete state that no portion of it could be computed and proved during the recess months.

Mr. E. Litchfield, who officiated in charge of the Forest Survey Branch during the Superintendent's absence on leave, reports that Mr. Kelly, who towards the close of the field season held charge of the Goalpara survey, closed work and withdrew the establishment without having received orders to do so, and to this Mr. Litchfield chiefly attributes the partial failure and unsatisfactory results of the season's operations.

Revenue survey traverse data.

54. The traverse data of the Assam Revenue Survey, which was obtained from the Surveyor General's Office, could not be made use of, as no permanently-marked stations were found on the ground, and, with the exception of some masonry pillars on the Bhutan frontier, the positions of which appear to have been fixed, nothing in the way of village tri-junction platforms were found in or within a reasonable radius of the forest. Had these been found, they would have formed a useful basis for a portion of the topographical work. Mr. Litchfield states that from enquiries made on the spot, he considers that the village tri-junction marks were never anything more than mud heaps, and that they have now disappeared.

55. The total expenditure incurred on account of the survey of the forests in the Goalpara district, including all charges for the year, was R21,616. Owing to coolie labour not being readily obtainable locally, men had to be imported into Assam, and hence the expenditure under this head was comparatively high.

Cost.

The mileage cost-rate will be given after the work has farther advanced. At present the survey is only in its preliminary stage.

Bengal.

56. As was reported last year, the southern boundary of the Singhbhoom forests touching on Bonai and Keonjhur still remains to be demarcated by the local Forest Department; and until this is done and reported ready for survey, a complete set of boundary maps of the Singhbhoom forests cannot be prepared.

Singhbhoom forests.

57. An expenditure of R1,116 was incurred during the year, chiefly on account of map-drawing and the publication of 4-inch sheets of the Singhbhoom survey.

Expenditure.

Berar.

58. The provincial boundary question, referred to in paragraph 45 of last year's progress report, between Berar and the Central Provinces, has been finally settled by the Local Government and approved by the Government of India in Foreign Department letter No. 390 I., dated 1st February 1890. It now only remains to have the existing Central Provinces pillars supplemented by intermediate ones; this is being done under the orders of the Commissioner of the Hyderabad Assigned Districts, and as soon as it is reported that the pillars are ready, a surveyor will be deputed to fix their positions and map the line of boundary.

Berar.

59. The expenditure incurred during the year on account of Berar amounted to R4,746, chiefly on account of map-drawing and the printing and the publishing of the 4-inch and 2-inch standard sheets. The last of the Berar sheets are now in the Press.

Cost.

Office Work.

60. An abstract of the computations will be found in Appendix A. The rectangular co-ordinates of 565 traverse stations were computed in duplicate. The number of triangles computed in duplicate was 1,609, and the rectangular co-ordinates of 763 trigonometrical stations were deduced. To determine the heights above sea-level of 711 stations, 1,477 triangles were worked in duplicate. The latitudinal and longitudinal values of 301 stations of the Great Trigonometrical Survey were converted into rectangular co-ordinates, and 3,103 heights above sea-level were deduced from 6,629 observations taken with the tangent scale clinometer. Sixty stations of the Revenue Survey were converted to forest survey co-ordinate values.

Computations.

61. The areas of 80 demarcated forests in Bashahr and 76 reserved forests in the Jubbulpore district, were deduced. With the exception of the few villages touching on the recently settled boundary of the Central Provinces and Berar, the detailed area statement for the whole of the villages (including the areas of the fields) have been computed, and a duplicate volume containing these areas will now be made over to the Deputy Commissioner of Ellichpur for record in his office.

Areas.

Map Drawing.

62. In Appendix B will be found a summary of the original drawings under preparation during the year, and sheets that have been published, as well as a statement of other miscellaneous office work that was completed.

Appendix B.

63. Owing to considerable additions having been made to some of the maps of the Naini Tal and Kumaon divisions since the publication of the Kumaon and Garhwal 4-inch sheets, and new areas having been reserved and surveyed in these divisions, it became necessary to revise five standard sheets with a view to printing a second edition of these maps; the drawing of these sheets is in progress. Two charts of triangulation and traversing on the 1-inch scale have been published; a map of the Kumaon, Garhwal, and Bijnor districts, showing the reserved and protected forests on the scale of 1 inch = 4 miles, is in progress, as well as six sheets containing the Government forests of Tehri-Garhwal on the 4-inch scale, and a map of the Korwa forest, in Jaunsar, on the scale of 16 inches = 1 mile, is in the Press.

North-West Provinces.

64. For the Punjab 22 standard sheets on the scale of 4 inches = 1 mile, containing the leased forests of Bashahr, and four charts of triangulation on the 1-inch scale, are in progress; one 4-inch sheet of Bashahr is published, and another is in the Press, and a map of part of the Chamba territory, showing leased forests with boundaries of forest ranges and blocks, on the scale of 1 inch = 2 miles, is also in the Press.

Punjab.

65. A map on the scale of 4 inches = 1 mile of the Dambu reserve in the Garo Hills division of Assam, which was reported as being in progress last year, has now passed through the Press.

Assam.

66. Of the Bengal standard maps, 13 boundary sheets of the Singhbhoom forest on the 4-inch scale (including 10 that were reported last year as being in progress) have been sent to the Press.

Bengal.

67. Fifteen standard sheets of the Melghat survey on the scale of 4 inches = 1 mile, and four on the 2-inch scale, have been published, and four others on the 4-inch scale and two on the 2-inch scale have gone to Press, also three sheets of congregated village plans on the 4-inch scale have gone to Press. A standard sheet on the 4-inch scale and one on the 2-inch scale are ready for Press; they simply await the drawing of the provincial boundary which cannot be added until the boundary has been completely demarcated and the additional pillars surveyed. These two sheets, when published, will complete the Melghat series of maps.

Berar.

Eight charts of triangulation on the scale of 1 inch = 1 mile have been published, and a map of the Dariapur taluk, on a similar scale, has passed through the Press.

Central Provinces.

68. Of the 4-inch standard maps of the Central Provinces, ten sheets of the Jubbulpore forests, one of Raipur and two sheets of the Ahiri forests in the Chanda district, are in progress, also an index map to the forest survey of the district of Bhandara on the scale of 4 miles = 1 inch is in progress.

Burma.

69. For Burma a map of the Taungdwin reserve with parts of Mingin and Kainand Seywagyaung, a map of the Ye-u proposed reserve, as well as a map of the Kendat proposed reserve, all on the scale of 1 inch = 1 mile, have gone to the Press.

Forest map of India.

70. The forest map of India reported in paragraph 59 of last year's report as being in progress, was published during the year.

Tracings and other miscellaneous work.

71. For the Forest Department and various district officers, 90 tracings were prepared, 825 maps were cut up and mounted in book form, and 1,769 printed maps were coloured.

Lists of best available maps for forest purposes.

72. The detailed lists of the best available maps of the Reserved, Protected and Unclassed forests in the several provinces under the Government of India continue to be revised from time to time, and the forest information on the provincial maps is duly posted as changes occur.

The map records of the following provinces have been revised :—

Central Provinces.	Baluchistan.
Bengal.	Berar.
Assam.	Oudh.
Tenasserim (Lower Burma).	School Circle (North-West Provinces).

Others are in progress.

Forest School.

Drawing classes.

73. Two drawing classes, composed of 73 students, were held in the Forest School building from 1st July to 31st October; the hours of attendance were from 7 to 8½ A.M. for 5 days of the week, and the classes were instructed by Messrs. T. S. Marten and A. Descubes, Assistants in the Forest Survey Branch.

Field work.

74. The instruction in field surveying was imparted by an officer on the permanent staff of the Forest School.

Photographs of Rans in Saharanpur district.

75. Towards the close of the recess season Mr. T. S. Marten was deputed to the Saharanpur district to prepare, for forest purposes, a set of photographs of the main Rans which drain the Eastern Siwaliks. Photographs of 10 Rans were taken, and the negatives, comprised of 30 plates, were made over to the Conservator of Forests, School Circle.

Officers of the Superior Staff.

Mr. W. H. Reynolds, Superintendent of Forest Surveys.

76. Mr. W. H. Reynolds, Superintendent of Forest Surveys, held charge of the Forest Survey Branch up to the 21st January 1890, when he proceeded no

furlough. He left Dehra on the 4th December, and was at Dhubri with the Goalpara party from 9th to 13th idem; from the 16th to the 24th December he was with the Jubbulpore party, and from the 27th December 1889 to the date of his proceeding on leave (20th January) he was with the Bhandara and Raipur parties.

Mr. E. Litchfield, Deputy Conservator of Forests.

77. Mr. E. Litchfield, Deputy Conservator of Forests, took the field on the 29th October and held charge of the Goalpara Survey in Assam from that date up to 15th March 1890; he then proceeded to head-quarters, and was at Dehra up to the 10th May, when he started for Bashahr and supervised the 4-inch, and took part in the 1-inch surveys that were in progress there up to the beginning of September, when he started for Dehra and arrived at head-quarters on the 4th October. He officiated in charge for Mr. Reynolds during the latter officer's absence on furlough, or from 21st January to the close of the survey year. Mr. Litchfield's 1-inch work in Bashahr is very creditably done, considering he had other work to occupy his attention whilst there.

Mr. J. C. Kelly, Sub-Assistant Conservator of Forests.

78. Mr. J. C. Kelly, Sub-Assistant Conservator on the Executive Staff of the Assam Forest List, was deputed to the Forest Survey Branch to assist in the survey of the Goalpara forests. He joined at Dhubri on the 10th December 1889, and at the close of the field season, on the 16th June, he returned to forest work. He held charge of the Goalpara Survey from the 15th March to the close of the field season. Mr. Litchfield does not report favourably on his work.

Forest Surveyors.

Mr. T. S. Marten.

79. Mr. T. S. Marten was in charge of the field work in the Jubbulpore district from the beginning of November 1889 to the end of May. He left Dehra on the 4th November, and worked chiefly in the pergunnahs of Sehora and Merwara, and returned to head-quarters on the 1st June 1890. During the recess months he was employed on the drawing of the Jubbulpore and Bashahr 4-inch sheets for publication, but his outturn of drawing was not altogether satisfactory.

Mr. James Marten.

80. Mr. James Marten took the field on the 4th November, and was employed, with a party of sub-surveyors, on the 4-inch detail survey of the forests in the Raipur district up to the 29th May; his work was confined chiefly to the Dhamtari and Sahawa pergunnahs. After closing the field season in the Raipur district at the end of May, Mr. Marten proceeded to Bashahr, where he was employed up to the close of the survey year, on 1-inch work in the higher Himalayas. He succeeded in turning out some excellent work, but it is rather too detailed for the small scale of the survey.

Mr. A. Descubes.

81. Mr. A. Descubes, who joined the Forest Survey Branch on the 18th January 1887, was appointed to the temporary establishment in the same year, and on the 5th December, by Government of India letter No. 1260 F., dated 5th December 1889, he was appointed permanently and transferred to the Survey of India list as a draftsman on the staff of that Department, but on deputation to the Forest Survey Branch. He has throughout the year been employed at the head-quarters office in preparing special drawings for forest

purposes, and in revising and posting to date forest information to the provincial map records, as well as much useful work of a miscellaneous character. He also took a drawing class at the Forest School during the recess months. He is a very quick, willing, and hard-working assistant, and does his work in a most satisfactory manner.

Mr. Charles Litchfield.

82. Mr. C. Litchfield was employed on the 4-inch detail survey of the forests in the Bhandara district from the end of November to the middle of May. He left Dehra on the 19th November and commenced field operations on the 25th idem, and after closing work in the Bhandara district he proceeded, on the 16th May, to Bashahr, and was employed there on 1-inch surveys up to the close of the survey year. He succeeded in turning out a very good season's work, and is a most promising surveyor.

Mr. J. H. Nichol.

83. Mr. J. H. Nichol, who was appointed a junior assistant in the Survey Branch, was transferred to the Survey of India list on the 1st January 1890, after passing the prescribed entrance examination for the Junior Branch of that department. From the 20th November 1889 to the 28th April 1890, he was employed with the Goalpara Survey in Assam on triangulation and traversing, and from May to the close of the survey year (except for 1½ months, when he was on leave) he was employed in Bashahr on triangulation. His return of work is rather small and cannot be considered as altogether satisfactory.

He was on sick leave from 4th June to 17th July 1890.

Sub-Surveyors.

Strength of the establishments.

84. The average strength of the Native establishment employed during the field season on each kind of work, was—

Triangulation	1
Traversing	6
Plotting and computing	8
Plane-tabling	25
In field	40
At head-quarters	30
TOTAL	70

The Native surveyors and office establishment have throughout the year worked well.

Health of the establishment.

85. During the early months of the field season the establishment in the Goalpara district of Assam suffered greatly from malarial fever, and consequently many of the daily labour-men, who had been imported into the district from Bengal, became alarmed and absconded, thus retarding the survey work in that district; also in the Raipur district of the Central Provinces malarial fever was very prevalent, and the establishment in that district suffered a good deal.

Work done by the Survey of India for the Forest Survey Branch.

86. The maps of the Forest Survey Branch continue to be photo-zincographed at the Trigonometrical Branch of the Survey of India Department at Dehra Dun, and much in the way of miscellaneous printing has been done for us by that office.

The charges on account of work done by the Survey of India for the Forest Survey Branch, including cost of maps received from the Calcutta Office, amounted to ₹5,789. This figure includes the sum of ₹1,535 for printing and publishing 75 copies of the forest map of India.

Documents accompanying the Report.

87. The following documents are appended to this Report :—

1. Index Map to the Forest Survey of Bashahr, Punjab, scale 1″= 4 miles.
2. Index Map to the Forest Survey of District Jubbulpore, Central Provinces, scale 8 miles = 1″.
3. Index Map to the Forest Survey of District Raipur, Central Provinces, scale 8 miles = 1″.
4. Index Map to the Forest Survey, District Chanda, Ahiri Reserved Forest, scale 1″ = 1 mile.
5. Index Map to the Forest Survey District, Bhandara, Central Provinces, scale 1″= 4 miles.
6. Appendix A.—Summary of outturn of field work and computations.
7. Appendix B.—Summary of outturn of drawing and miscellaneous work.
8. Appendix C.—Summary of expenditure from the 1st October 1889 to 30th September 1890, showing the amounts expended on field and office work (Imperial).
9. Appendix D.—Area topographically surveyed by the Forest Survey Department during 1889-90.
10. Annual Form No. 58.—Summary of Revenue and Expenditure during the Financial year.
11. Annual Form No. 59.—Account-current.
12. Annual Form No. 61.—Revenue received and Outstandings on account of Revenue.

DERADUN: W. H. REYNOLDS,

8th December 1890. *Superintendent of Forest Surveys.*

APPENDIX A.

Summary of Outturn of Field Work and Computations by the Forest Survey Department, from 1st October 1889 to 30th September 1890.

No.	North-West Provinces, Punjab, Central Provinces, and Assam Surveys.		Amount.	Remarks.
	Plane-tabling.			
1	Area plane-tabled on the scale of 4″=1 mile—			
	(*a*) Tehri-Garhwal—School Circle, North-Western Provinces	35·00		
	(*b*) Karamba—School Circle, North-Western Provinces	3·50		
	(*c*) Korwa—School Circle, North-Western Provinces	·37		
	(*d*) Ninglat-Gogar—Central Circle, North-Western Provinces	2·50		
	(*e*) Bashahr—Punjab	198·00		
	(*f*) Jubbulpore—Central Provinces . .	125 00		
	(*g*) Raipur „ „ . .	142·50		
	(*h*) Chanda „ „ . .	28·00		
	(*i*) Bhandara „ „ . .	123·00		
		657·42		
	Area plane-tabled on the scale of 1″=1 mile— Bashahr	302·00		
	Area plane-tabled on the scale of 16″=1 mile—		1029·42	square miles.
	(*a*) Jubbulpore—Central Provinces . .	34·00		
	(*b*) Raipur „ „ . .	4·00		
	(*c*) Bhandara „ „ . .	32 00		
		70 00		
2	Boundary surveyed on 16″ scale (linear)—			
	(*a*) Jubbulpore—Central Provinces . .	275	573	
	(*b*) Raipur „ „ . .	26		
	(*c*) Bhandara „ „ . .	272		
3	Boundary surveyed on 4″ scale—			
	(*a*) Late Iron Company Grant—Central Circle, North-Western Provinces. .	18·00		
	(*b*) Ninglat-Gogar—Central Circle, North-Western Provinces	14·00	60·50	
	(*c*) Khurpa Tal—Central Circle, North-Western Provinces	28·50		
	(*d*) Jubbulpore—Numbers added to Forest boundary pillars on	...	116	linear miles.

No	North-Western Provinces, Punjab, Central Provinces, and Assam Surveys.		Amount.	Remarks
4	Number of boundary pillars fixed—			
	(*a*) Late Iron Company Grant—Central Circle, North-Western Provinces . . .	40		
	(*b*) Ninglat-Gogar—Central Circle, North-Western Provinces	191	346	pillars
	(*c*) Khurpa Tal—Central Circle, North-Western Provinces	115		
	Triangulation.			
5	Area triangulated—			
	(*a*) Bashahr—Punjab	378		
	(*b*) Bhandara—Central Provinces . .	515	987	square miles.
	(*c*) Goalpara—Assam	94		
6	Number of Theodolite stations—			
	(*a*) Bashahr—Punjab	26	72	
	(*b*) Bhandara—Central Provinces . .	46		
7	Number of points fixed—			
	(*a*) Bashahr—Punjab	186		
	(*b*) Bhandara—Central Provinces . .	199	416	
	(*c*) Goalpara—Assam	31		
8	Number of Plane-table stations in area surveyed—			
	(*a*) Tehri-Garhwal—School Circle, North-Western Provinces	3,696		
	(*b*) Karamba—School Circle, North-Western Provinces	905		
	(*c*) Korwa—School Circle, North-Western Provinces	123		
	(*d*) Ninglat-Gogar, Mora and Dolmar—Central Circle, North-Western Provinces	2,507		
	(*e*) Khurpa Tal—Central Circle, North-Western Provinces	300	1,08,134	
	(*f*) Bashahr—Punjab	20,096		
	(*g*) Jubbulpore—Central Provinces . .	24,962		
	(*h*) Raipur „ „ . .	23,791		
	(*i*) Chanda „ „ . .	6,392		
	(*j*) Bhandara „ „ . .	25,362		

No.	North-Western Provinces, Punjab, Central Provinces, and Assam Surveys.		Amount.	Remarks.
9	Number of Plane-table stations for testing work—			
	(*a*) Tehri-Garhwal—School Circle, North-Western Provinces	622		
	(*b*) Karamba—School Circle, North-Western Provinces	74		
	(*c*) Korwa—School Circle, North-Western Provinces	36		
	(*d*) Ninglat-Gogar and Mora—Central Circle, North-Western Provinces	649	9,117	
	(*e*) Bashahr—Punjab	2,852		
	(*f*) Jubbulpore—Central Provinces	800		
	(*g*) Raipur—Central Provinces	3,213		
	(*h*) Chanda „ „	246		
	(*i*) Bhandara „ „	625		
	Traversing.			
10	Area traversed—			
	Goalpara—Assam		437	square miles.
11	Number of linear miles traversed—			
	Goalpara—Assam		199	
12	Number of traverse stations—			
	Goalpara—Assam		1,291	
13	Check surveys or "*Partals*"—			
	(*a*) Jubbulpore—Central Provinces	11		
	(*b*) Raipur „ „	103	141	miles.
	(*c*) Bhandara „ „	27		
	Levelling.			
14	Levelling with Theodolite—			
	Raipur—Central Provinces		103	linear miles.
	Computations.			
15	Number of linear miles of traversing—			
	Chanda—Central Provinces		120¼	
16	Number of traverse stations computed in duplicate—			
	Chanda—Central Provinces		565	
17	Number of stations the co-ordinate values of which were converted from Revenue to Forest Survey "origin"—			
	Assam			

No.	North-Western Provinces, Punjab, Central Provinces, and Assam Surveys.		Amount.	Remarks.
18	Number of triangles in duplicate—			
	(*a*) Bashahr—Punjab	1,048		
	(*b*) Raipur—Central Provinces . . .	207	1,609	
	(*c*) Bhandara „ „ . . .	354		
19	Number of points fixed thereby, and of which the rectangular co-ordinates have been computed in duplicate—			
	(*a*) Bashahr—Punjab	464		
	(*b*) Raipur—Central Provinces . . .	123	763	
	(*c*) Bhandara „ „ . . .	176		
20	Number of triangles worked in duplicate to determine heights—			
	(*a*) Bashahr—Punjab	888		
	(*b*) Raipur—Central Provinces . . .	243	1,477	
	(*c*) Bhandara „ „ . . .	346		
21	Number of points of which the heights were determined thereby—			
	(*a*) Bashahr—Punjab	435		
	(*b*) Raipur—Central Provinces . . .	103	711	
	(*c*) Bhandara „ „ . . .	173		
22	Abstract of horizontal angles in duplicate—			
	(*a*) Bashahr—Punjab	1,719		
	(*b*) Bhandara—Central Provinces . .	902	2,735	
	(*c*) Goalpara—Assam	114		
23	Number of Great Trigonometrical stations computed in duplicate—			
	(*a*) Bashahr—Punjab	22		
	(*b*) Bhandara—Central Provinces . .	30		
	(*c*) Raipur „ „ . .	88		
	(*d*) Jubbulpore „ „ . .	127	301	
	(*e*) Goalpara—Assam	21		
	(*f*) Dehra Dun—School Circle, North-Western Provinces	9		
	(*g*) Bhagirathi—Central Circle, North-Western Provinces	4		

No.	North-Western Provinces, Punjab, Central Provinces, and Assam Surveys.		Amount.	Remarks.
24	Number of tangent scale clinometer observations—			
	(*a*) Tehri-Garhwal—School Circle, North-Western Provinces	376		
	(*b*) Karamba—School Circle, North-Western Provinces	75		
	(*c*) Korwa—School Circle, North-Western Provinces	15		
	(*d*) Ninglat-Gogar, Dolmar and Mora—Central Circle, North-Western Provinces	335	6,629	
	(*e*) Bashahr—Punjab	2,342		
	(*f*) Jubbulpore—Central Provinces . .	1,095		
	(*g*) Raipur— „ „ . .	1,799		
	(*h*) Chanda— „ „ . .	86		
	(*i*) Bhandara— „ „ . .	506		
25	Number of heights determined by tangent scale clinometers—			
	(*a*) Tehri-Garhwal—School Circle, North-Western Provinces	172		
	(*b*) Karamba—School Circle, North-Western Provinces	38		
	(*c*) Korwa—School Circle, North-Western Provinces	7		
	(*d*) Ninglat-Gogar, Dolmar and Mora—Central Circle, North-Western Provinces	136	3,103	
	(*e*) Bashahr—Punjab	989		
	(*f*) Jubbulpore—Central Provinces . .	503		
	(*g*) Raipur „ „ . .	850		
	(*h*) Chanda „ „ . .	38		
	(*i*) Bhandara „ „ . .	370		
	Areas.			
26	Areas computed—			
	Bashahr—Punjab		80	forests.
	Jubbulpore—Central Provinces		76	forests.
	Melghat Taluk		2	bound volumes.

APPENDIX B.

Summary of Outturn of Drawing and Miscellaneous Works executed by the Forest Survey Branch, from 1st October 1889 to 30th September 1890.

No.	Particulars.	Number of sheets.	Remarks.
	Original Drawings.		
	North-Western Provinces.		
1	Kumaun and Garhwal Sheets, scale 4″=1 mile, Nos. LII, LIII, LIIIA, LIV and LIVA (Sheets Nos. LII, LIII and LIV, redrawn with additions)—(in progress).	5	
2	Chart of Kumaun and Garhwal Triangulation, scale 1″=1 mile, Nos. VI and VIII (published).	2	
3	Map of Kumaun, Garhwal, and Bijnor Districts, showing Reserved and Protected Forests, scale 1″=4 miles (in progress).	1	
4	Government Forests of Tehri-Garhwal in Jaunsar, scale 4″=1 mile, Sheets Nos. 333 $\frac{S.E.}{2}$, 333 $\frac{N.E.}{4}$, 348 $\frac{S.E.}{1}$, 348 $\frac{S.W.}{1}$, 348 $\frac{S.W.}{2}$ and 348 $\frac{N.W.}{3}$ (in progress).	6	
5	Map of the Korwa Forests in Jaunsar, scale 12″=1 mile (in Press).	1	
	Punjab.		
6	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 332 $\frac{S.W.}{3}$, scale 4″=1 mile (in Press).	1	
7	Map of the Government Forest in the Bashahr State, Punjab, Sheet No. 346 $\frac{S.W.}{4}$, scale 4″=1 mile (published).	1	
8	Map of the Government Forests in the District of Simla, Punjab, Sheets Nos. 331 $\frac{S.E.}{2}$, 331 $\frac{S.E.}{4}$, 331 $\frac{S.W.}{4}$, 332 $\frac{S.E.}{1}$, 332 $\frac{S.W.}{1}$, 332 $\frac{N.W.}{2}$, 332 $\frac{S.W.}{2}$, 332 $\frac{N.W.}{3}$, 332 $\frac{N.W.}{4}$, 333 $\frac{N.}{1}$, 346 $\frac{S.E.}{1}$, 346 $\frac{S.W.}{1}$, 346 $\frac{S.E.}{2}$, 346 $\frac{N.E.}{3}$, 346 $\frac{S.W.}{3}$, 346 $\frac{N.E.}{4}$, 347 $\frac{N.W.}{1}$, 347 $\frac{N.E.}{1}$, 347 $\frac{N.W.}{2}$, 347 $\frac{N.E.}{3}$, 347 $\frac{N.W.}{4}$, 352 $\frac{S.W.}{1}$, scale 4″=1 mile (in progress).	22	
9	Chart of Bashahr Triangulation, scale 1″=1 mile, Nos. 331, 332, 333, 348 (in progress).	4	
10	Map of part of the Chamba Territory, showing leased forests with boundaries of ranges and blocks, scale 1″=2 miles (sent to Press).	2	
	Assam.		
11	Map of the Dambu Reserve, Garo Hills Division, scale 4″=1 mile (published).	1	
	Bengal.		
12	Map of the Government Forests in the Chota-Nagpur Division, Singhbhoom, scale 4″=1 mile, Sheets Nos. 125 $\frac{S.E.}{1\&3}$, 125 $\frac{S.E.}{2\&4}$, 126 $\frac{S.E.}{1}$, 126 $\frac{N.E.}{1}$, 126 $\frac{S.}{2}$, 126 $\frac{N.E.}{2}$, 126 $\frac{N.W.}{2}$, 126 $\frac{S.W.}{2}$, 126 $\frac{N.E.}{3}$, 126 $\frac{N.W.}{4}$, 126 $\frac{N.E.}{4}$, 127 $\frac{S.W.}{4}$, 157 $\frac{N.W.}{3}$ (in Press).	13	

No.	Particulars.	Number of sheets.	Remarks
	Berar.		
13	Maps of the Melghat Taluk, District Ellichpur, Berar, scale 4″=1 mile, Sheets Nos. 12 S. E./1, 12 S. E./2, 12 S. E./3, 12 S. E./4, 13 N. E./1, 13 N. E./2, 19 N. E./1, 19 S. W./1, 19 N. E./2, 19 N. W./3, 19 S. W./3, 19 N. W./4, 19 S. W./4, 20 N. W./1, 20 N. W./2 (published).	15	
14	Map of the Melghat Taluk, District Ellichpur, Berar, part of Sheet No. 19, containing village of Raipur, scale 4″=1 mile (published).	1	
15	Map of the Melghat Taluk, District Ellichpur, Berar, part of Sheet No. 19, containing village of Khaninal (published).	1	
16	Map of the Melghat Taluk, District Ellichpur, Berar, part of Sheet No. 19, containing village of Chowrakund (published).	1	
17	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, Nos. 13 N. E., 19 N. E., 19 S. E., and 20 N. W. (published).	4	
18	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, Nos. 13 S. E. and 19 N. W., S. W., scale 2″=1 mile (sent to Press).	2	
19	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, Nos. 14 N. E., in two parts, and 20A. N. W. in two parts, scale 4″=1 mile (sent to Press).	4	
20	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, Nos. 14 N. E. and 20A. N. W., scale 2″=1 mile (sent to Press).	2	
21	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, No. 14 N. W./3, Bhingara Jagir, scale 4″=1 mile (in progress).	1	
22	Map of the Melghat Taluk, District Ellichpur, Berar, scale 2″=1 mile, Nos. 13 & 14 S. W., N. W. scale 2″=1 mile (in progress).	1	
23	Map of the Melghat Taluk, District Ellichpur, Berar, Sheets Nos. 19 N. E./1, 19 S. W./1, 19 N. W./2, 19 S. W./3, 19 N. E./3, 19 N. W./3, 20 N. W./2, 26 S. W./1, 26 N. W./1, 26 N. W./3, scale 4″=1 mile, reduced in ½ scale (2″=1 mile) (sent to Press).	10	
24	Chart of Melghat Triangulation, scale 1″=1 mile, Sheets Nos. 12, 13, 14, 19, 20, 20A., 26, 27 (published).	8	
25	Map of Dariapur Taluk, Berar, scale 1″=1 mile (published).	1	
	Central Provinces.		
	Jubbulpore.		
26	Maps of the Government Forests in the District of Jubbulpore, scale 4″=1 mile, Sheets Nos. 107 S. E./1, 107 S. W./2, 107 S. W./3, 107 S. E./3, 107 S. W./4, 108 N. W./1, 108 N. W./2, 108 N. W./3, 108 N. W./4, 130 S. W./3 (in progress).	10	

No	Particulars.	Number of sheets.	Remarks.
	Raipur.		
27	Map of the Government Forest in the District of Raipur, Sheet No. 187 $\frac{S.W.}{3}$, scale 4″=1 mile (in progress).	1	
	Chanda.		
28	Maps of the Government Forests in the District of Chanda, scale 4″=1 mile, Sheets Nos. 123 $\frac{S.W.}{1 \& 2}$, 123 $\frac{S.W.}{3 \& 4}$ (in progress).	2	
	Bhandara.		
29	Index Map to the Forest Survey of District Bhandara, scale 4 miles =1″ (in progress).	1	
	Burma.		
30	Map of Taungdwin Reserve, with parts of Mingin and Kain and Seywagyaung, Upper Burma, scale 1″=1 mile (sent to Press).	1	
31	Map of the Ye-u proposed Reserve, Upper Burma, scale 1″=1 mile (sent to Press).	1	
32	Map of the Kindat proposed Reserve, Upper Burma, scale 1″=1 mile (sent to Press).	1	
	India.		
33	Forest Map of India showing the distribution of Forest areas, gazetted under the Indian Forest Laws, up to 1st April 1888, scale 1″=48 miles (published).	1	
	Tracings made.		
34	Tracings made for various Forest and District Officers	90	
35	Jubbulpore Forest, Sheet No. 130 $\frac{S.W.}{3}$, scale 4″=1 mile	1	
	Map-colouring.		
36	Printed Maps of various kinds, coloured . . .	1,769	
37	Kumaun and Garhwal Forest Survey, scale 4″=1 mile Sheets Nos. XI, XX, XXXVII, XXXVIII, XLIII, XLIX, LI, LIX, LXVIII, LXIX, LXXVI, LXXVIII (duplicate.)	24	
38	Deodar Forests in the Bhagirathi Valley, Tehri-Garhwal, scale 4″=1 mile, sheet No. 1 (duplicate).	2	
	Mounted Maps.		
39	Painted Maps, mounted in book form	825	

APPENDIX C.

Summary of Expenditure from 1st October 1889 to 30th September 1890, showing the amounts expended in Field and Office Works of the Forest Surveys (Imperial).

No.	Months.	North-Western Provinces and Oudh.									Punjab.			Bengal.		Central Provinces.											Berar		Assam.			Imperial head-quarters.	Grand Total.	Remarks.
		Central Circle.			School Circle.																												
		Kumaun and Naini Tal.			Tehri-Garhwal and Jaunsar.			Kamaon.	Korwa.	Oudh.	Bashahr.			Singhbhoom.		Jubbulpore.			Raipur.			Chanda.			Bhandara.			Melghat.		Goalpara.					
		Field.	Office.	General.	Field.	Office.	General.	Field.	Field.	Kheri, General.	Field.	Office.	General.	Office.	General.	Field.	Office.	General.	Field.	Office.	General.	Field.	Office.	General.	Field.	Office.	General.	Office.	General.	Field.	Office.	General.			
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R			
1	October 1889	...	...	...	...	...	56	8	...	544	523	228	1,325	249	410	...	17	84	...	121	70	...	56	...	...	...	...	835	10	...	..	1,073	833	6,442	
2	November ,,	74	50	...	190	...	...	109	...	...	1,519	54	594	228	85	...	67	296	...	64	272	...	59	...	...	58	180	355	...	...	...	1,102	1,377	6,733	
3	December ,,	24	...	...	553	...	50	130	50	...	714	253	317	29	...	...	...	206	...	4	402	...	40	...	137	60	189	56	...	...	...	21	965	4,200	
4	January 1890	...	...	...	...	...	...	...	...	...	...	...	...	...	...	1,104	...	993	811	...	476	211	20	14	148	...	397	...	...	1,45	...	2,122	742	8,491	
5	February ,,	71	16	...	...	6	...	...	...	...	12	420	...	87	...	1,045	8	26	...	5	10	...	...	...	721	10	132	216	...	2,60	...	2,615	1,276	9,288	
6	March ,,	70	14	...	...		...	..	...	..	31	146	...	...	..	1,023	...	116	1,828	...	110	700	..	...	1,441	...	116	124	165	4,07	...	1,140	4,167	15,270	
7	April ,,	...	...	...	...	15	...	...	..	..	...	134	...	...	...	1,006	..	106		...	100	...	...	...	841	...	121	174	...	300	...	575	1,286	4,658	
8	May ,,	...		...	...	...	...	...	...	...	...	166	100	...	...	1,052	...	102	1,582	...	328	...	...	...	798	...	184	108	...	...	...	231	1,739	6,690	
9	June ,,		10	.	...	...	...	...	...	...	...	189	300	7	..	821	...	392	...	...	71	...	9	...	...	..	...	109	..	...	3	525	1,215	3,651	
10	July ,,	...	19	.	...	...	...	...	..	...	445	323	168	19	...	...	50	131	672	42	315	...	23	..	...	25	60	136	345	2,056	12	752	2,759	8,352	
11	August ,,	..	10	...	...	.		...	..	...	2,985	68	401	2	..	...	328	5	.	56		...	10	...	476	24	95	141	981	140	...	520	1,569	7,811	
12	September ,,	277	..	182	...	...	.	...	...	..	5,692	152	196	...	...	...	327	...	5	12	...	...	...	...	...	10	41	96	895	6	40	186	1,791	9,967	
	Total	516	119	182	743	21	106	247	50	544	11,927	2,133	3,401	621	495	6,051	797	2,457	4,898	304	2,154	911	217	14	4,562	187	1,815	2,350	2,396	10,69	55	10,862	19,719	91,553	
		817			870			247	50	544	17,461			1,116		9,305			7,356			1,142			6,564			4,746		21,616			19,719	91,553	
		2,528									17,461			1,116		24,367												4,746		21,616			19,719	91,553	

APPENDIX E.

Area topographically surveyed by the Forest Survey Department during 1889-90.

No.	Province or District.	Area in square miles.			Remarks.
		Demarcated forests.	Other lands.	Total.	
1	Central Provinces . Jubbulpore .	159	...	159	
	Raipur . .	146·50	...	146·50	
	Chanda . .	28	...	28	
	Bhandara .	155	...	155	
2	Punjab—Bashahr . . .	198	302	500	All forests in Bashahr, whether demarcated or not, are held in lease by the Punjab Government.
3	North-Western Provinces . Tehri-Garhwal .	35	...	35	
	Karamba .	3·50	...	3·50	
	Korwa . .	·37	...	·37	
	Ninglat-Gogar	2·50	...	2·50	
	Total .	727·87	302	1,029·87	

ANNUAL FORM No. 58.

Forest Department, India, Forest Surveys Division.

Summary of Revenue of the different Divisions during 1889-90.

Receipts.	R	a.	p.
I.—Timber and other produce removed from the Forests by Government Agency—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other minor produce	...		
II.—Timber and other produce removed from the Forests by Consumers or Purchasers—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Grazing and fodder grass	...		
e. Other minor produce	...		
III.—Drift and Waif Wood and confiscated Forest Produce .	...		
IV.—Revenue from Forests not managed by Government—			
a. Duty on foreign timber and other forest produce . .	...		
b. Revenue from shared and private forests . . .	...		
V.—Miscellaneous—			
a. Fines and forfeitures	...		
b. Refunds	8	14	11
c Other sources	210	13	0
Total Receipts .	219	11	11

ANNUAL FORM No. 58—*continued.*

FOREST DEPARTMENT, INDIA, FOREST SURVEYS DIVISION.

Summary of Expenditure of the different Divisions during 1889-90.

Expenditure.

	R	a.	p.
A.—CONSERVANCY AND WORKS.			
I.—Timber and other Produce removed from the Forests by Government Agency—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other Minor Produce	...		
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers	...		
III.—Drift and Waif-Wood and confiscated Forest Produce	...		
IV.—Revenue from Forests not managed by Government—			
a. Duty on Foreign Timber and other Forest Produce	...		
b. Revenue from Shared and Private Forests	...		
V.—Rent of Leased Forests and payments to Shareholders in Forests managed by Government	...		
VI.—Live-stock, Stores, Tools and Plant—			
a. Purchase of Cattle	...		
b. Feed and Keep of Cattle	152	8	10
c. Purchase of Stores, Tools and Plant	1,481	6	6
VII.—Communications and Buildings—			
a. Roads and Bridges	...		
b. Buildings	...		
c. Other Works	...		
VIII.—Demarcation, Improvement, and Extension of Forests—			
a. Demarcation	...		
b. Compensation for Land and Rights	...		
c. Surveys and Working-Plans	1,153	6	0
d. Sowing and Planting	...		
e. Protection from Fire	...		
f. Other Works	...		
IX.—Miscellaneous—			
a. Refunds	...		
b. Law Charges	...		
c. Other Charges	10	4	0
TOTAL A.—CONSERVANCY AND WORKS	2,800	4	4
B.—ESTABLISHMENTS.			
I.—Salaries—			
a. Conservators	...		
b. Superior Officers	7,679	3	6
$\frac{c}{1}$. Upper Subordinate Establishments	1,347	2	7
$\frac{c}{2}$. Lower Subordinate Establishments	4,457	2	4
c. Deputation and Special Allowances	..		
II.—Travelling Allowances:—			
a. Conservators	...		
b. Superior Officers	1,685	15	6
$\frac{c}{1}$. Upper Subordinate Establishments	494	13	10
$\frac{c}{2}$. Lower Subordinate Establishments	163	13	8
Carried over	15,828	3	5

ANNUAL FORM No. 58—*concluded.*

FOREST DEPARTMENT, INDIA, FOREST SURVEYS DIVISION.

Summary of Expenditure of the different Divisions during 1889-90.

	R	a.	p.
B.—ESTABLISHMENTS—*continued.*			
Brought forward .	15,828	3	5
III.—Contingencies;—			
a. Stationery	...		
b. Carriage of Tents and Records	261	7	9
c. Rents, Rates, and Taxes	737	6	8
d. Pay of Police Guards	...		
e. Official Postage	321	8	6
f. Sundries	1,239	6	8
TOTAL B.—ESTABLISHMENTS . .	18,388	1	0
Grand Total of Expenditure .	21,188	5	4

DR. *Account-Current for the year 1889-90.* CR.

	R. a. p.	R. a. p.		R. a. p.	R. a. p.
To Cash Balance . .	.....	.....	By Expenditure, as per Annual Summary, Form No. 58 . .	.....	21,188 5 4
To VIII.—Assessed Taxes— Income Tax—Deductions from salaries .	.....	877 10 5	By Deposits . . .	.....	.....
To Revenue, as per Annual Summary, Form No. 58	.....	219 11 11			
To Service Funds—			By Forest Cash Remittances—Local—		
Civil Fund—Ordinary, Bengal . . .	.....	.....			
Civil Fund—Additional, Bengal . . .	.....	.....			
Military Fund—Bengal .	.....	.....	Remittances to Treasuries . .	...	.....
Military Fund—Madras .	.....	.....	Inter-Divisional Transfers . . .	.....	.....
Military Orphan Fund—Bengal . . .	.....	.....			
Uncovenanted Service Family Pension Fund, Bengal . . .	529 12 0	.....			
General Family Pension Fund . . .	.....	.....	By Advances Recoverable .	.....	64,100 5 9
Hindu Family Annuity Fund . . .	.....	529 12 0	By Suspense . . .	.....	1,367 11 10
To Deposits . . .	.....	.....	By Account Current (other Governments)—		
To Forest Cash Remittances—Local—			Remittances to the Government of N.-W. P and Oudh . .	5,064 7 11	.....
Forest cheques drawn .	344 2 11	.....	Remittances to Central Provinces .	25,790 0 0	.....
Inter-Divisional Transfers	.....	344 2 11	Remittances to Government of Punjab . .	15,394 0 0	.....
To Advances Recoverable .	.....	61,996 13 1	Remittances to the Government of Bengal.	1,303 0 0	.....
To Suspense . . .	.....	1,371 6 10	Remittances to the Government of Assam	16,211 0 0	... ...
To Account Current (other Governments)—					63,762 7 11
Remittances from Government of N.-W. P. and Oudh .	49,739 10 9	... ..			
Remittances from Central Provinces .	20,754 11 11	.....			
Remittances from Government of Punjab . .	4,045 2 8	.....	By Account Current with Foreign States—		
Remittances from Government of Assam .	11,746 0 2	.....	Berar Suspense Account	. ...	6,464 6 10
		86,285 9 6			
To Account Current with Foreign States—			By Inter-Departmental Transfers—		
Berar Suspense Accounts	.....	75 0 0	Military Department .	.....	.....
To Inter-Departmental Transfers—			Civil Department—		
Military Department .	.....	.....	Mathematical Instrument Department .	305 0 0	.....
Civil Departments—			Miscellaneous .	161 15 0	
Survey of India .	2,479 6 0	.....			466 15 0
Mathematical Instrument Department .	3,158 12 0	.....			
Miscellaneous . .	17 0 0	.....			
		5,650 2 0	By Cash Balance . .	.....	.....
TOTAL .		1,57,350 4 8	TOTAL .		1,57,350 4 8

ANNUAL FORM No. 61.

OUTSTANDINGS AND LIABILITIES ON ACCOUNT OF CONTRACTORS AND DISBURSERS FOR 1889-90.

Division.	Department Debtor.			Department Creditor.			Balance Due.	
	At commencement of year.	Recoveries in cash and value of supplies and work done during the year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To Department (Outstandings.)	By Department (Liabilities.)
		R a. p.	R a. p.	R a. p.	R a. p.	R a. p.	R a. p.	
Forest Surveys . .	...	61,996 13 1	61,996 13 1	2,542 0 5	64,100 5 9	66,642 6 2	4,645 9 1	...
Total . .	...	61,996 13 1	61,996 13 1	2,542 0 5	64,100 5 9	66,642 6 2	4,645 9 1	..

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